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Final Report

U of I Teaching Hospital
Vet: MAURIA A O'BRIEN
1008 W. HAZELWOOD DR
URBANA, IL 61802

Case#: 14-42974
Accessioned: 12/13/14
Report Generated: 12/19/14 @ 12:00 PM by DC3
Results Last Modified: 12/18/14 @ 2:02 PM

Case ID	Owner	Coordinator
Miley V1437988	Wills, Sarah L	STERN
Breed	Species	Sex / Neutered Age
German Shepherd	Canine (dog)	F / Y 7 Years

Pathology

Necropsy (VTH), Gross Report - Verified: 12/18/14 2:02 PM by LJ0
1442974 Stern
REF VET: Dr. O'Brien

GROSS DESCRIPTION (12/16/14):

The necropsy began at 1:26 PM.

An age unknown adult (per history), 30.4 kg, intact female, German Shepherd dog is submitted to the VDL for postmortem examination. The animal is submitted within 2 sealed (zip-tied) black garbage bags that are within a yellow Tupperware-type bin and covered with a blanket. The animal is submitted frozen and is thawed prior to examination. The animal is not in rigor. There is a small amount of brown to black (ceruminous) debris within the left and right external ear canals. There is a copious amount of blood exuding from the nose and oral cavity. The lower jaw (mandible) is deviated to the right and is freely movable. There are accumulations of dried blood all over the fur of the animal including face, neck, ventral thorax, ventral abdomen and all limbs. The claws of the right forelimb are longer than the left forelimb. There are formed feces protruding from within the anus. The animal exhibits mild to moderate autolytic change.

There are multiple projectile injuries within the skin and oral cavity and are described as follows:

1. Projectile injury #1: There is a 1.6 cm x 1.5 cm in diameter, slightly ellipsoid hole within the skin of the right cranial aspect of the shoulder. The hole is 31 cm caudal from the tip of the nose and 15.5 cm to the right of dorsal midline. The ellipsoid shape is in a slight caudal to cranial direction. There is a dark red rim surrounding the hole.
2. Projectile injury #2: There is a 1.8 cm x 1.5 in diameter, partially rounded to irregular hole within the skin of the ventral aspect of the mandible. The hole is 8.1 cm caudal from the tip of the mandible and just to the left of ventral midline. There is a triangle shaped flap of skin at the caudal most aspect of the hole with the base measuring 4 mm and the height measuring 6 mm. The edges of the hole are frayed in multiple regions.
3. Projectile injury #3: There is a 1.7 cm in diameter, circular hole within the skin of the ventral aspect of the neck at the level of the larynx. The hole is 23 cm caudal from the tip of the nose and 18.7 cm to the left of dorsal midline. There is mild fraying of the margins of the hole with small amounts of tissue protruding from within the hole.
4. Projectile injury #4: There is a large hole within the caudal aspect of the right side of the oral cavity. Within the oral cavity to the right side of the epiglottis is a 2 cm in diameter and partially circular hole within the oral mucosa. There is a large amount of clotted blood at the site and bone fragments are protruding from within the hole.

5. Projectile injury #5: There is a 1.5 cm in diameter, circular hole within the skin of the dorsum just caudal to the shoulder blades. The hole is 53.9 cm caudal from the tip of the nose and 1.5 cm to the left of dorsal midline.

There are multiple projectiles recovered and are described as follows:

1. Projectile #1: Within the left forelimb at the level of the elbow joint and slightly medial and caudal to the joint is a projectile. The projectile has a mushroom appearance, has a metal jacket and measures 1.1 cm in diameter. Upon manual removal of the projectile the jacket separates from the slug. There is a large amount of red discoloration of the triceps brachii muscle at this site. The muscle is torn and friable musculature.
2. Projectile #2: Within the soft tissue and bone fragments of the left mandibular bone and lateral to tooth 304 is a projectile. The projectile has an asymmetrical mushroom appearance, has a metal jacket and measures 1.1 cm in diameter. Oral mucosal epithelium is entrapped within the projectile.
3. Projectile #3: Within the right side of the neck at the level of C3-C5 is a projectile. The jacket of the projectile and the slug are separated. The jacket is somewhat flattened and the slug has a mushroom appearance. The diameter of the jacket could not be ascertained due to its flattened appearance. There is a large amount of red discoloration of the muscle at this site (serratus ventralis cervicis muscle, longus capitus muscle) and they are torn and friable. The projectile elements are found within a large 4 cm x 3 cm x 3 cm blood clot.

Extending from the skin at projectile injury #1 (right cranial aspect of shoulder) is a tract within the pectoral musculature of the right side. The tract extends within the muscles of the left pectoral; region and exits the body at projectile injury #3. There is dark red discoloration of the muscle lining the tract.

Extending from the skin at projectile injury #5 (dorsum) is a tract within the musculature of the left side of the body including the cutaneous trunci muscle, caudal aspect of the trapezius muscle, serratus ventralis muscle, and pectoral muscle as the tract runs medial to the scapula. The tract extends within the muscles of the medial aspect of the forelimb and extends into the diaphysis of the left humerus and terminates at the site of retrieval of projectile #1. Several metallic fragments are identified within the tract. The left forelimb is abnormally and freely movable at the level of the mid to distal humerus. The overlying skin is closed. The fracture of the diaphysis of the left femur is 8.7 cm distal to the head of the humerus. There are approximately 1-2 dozen bone fragments. The fragments range in size from pinpoint to 3 cm x 1.5 cm x 0.2 cm.

The mandible is deviated to the right. Teeth 102 and 103 have crown fractures. Extending from the hole in the oral mucosa on the right side of the lower jaw (projectile injury #4) is a tract within the musculature adjacent to the right side of the neck that is surrounding by red and torn musculature which extends from the right side of the oropharynx to the point of retrieval of fragments of projectile #3 (neck, level of C3-C5). Several metallic fragments are identified within the tract. The right mandible is fractured caudal to tooth 111. There are multiple small fragments of bone at this site. There is a large amount of expansion of the soft tissue surrounding the larynx, trachea, and esophagus by red discolored musculature, fascia is expanded by air, and clotted blood. There is expansion of the soft tissue surrounding the larynx by red-tinged and gelatinous material. The red discoloration of the soft tissue surrounding the trachea and esophagus extends to the level of the thoracic inlet. Several small metallic fragments are identified within the musculature adjacent to the left side of the esophagus and trachea (level of C1).

Within the oral cavity on the left side is a large defect (4 cm x 2.5 cm) within the oral mucosa and soft tissue beneath the tongue. There is dark red discoloration of the tissue at this site. There are multiple pieces of the left mandibular bone protruding from the defect within the oral cavity. There is a complete fracture of the mandibular symphysis and multiple fractures of the left mandibular bone (teeth 305-307). Bone fragments range in size from pinpoint to 1.5 cm x 1.0 cm x 0.1 cm. Within the genioglossus muscle of the intermandibular space is a tract lined by red discolored and torn muscle which extends from projectile injury #2 (ventral aspect of jaw). Within the soft tissue of the left mandible is a projectile (projectile #2).

The stomach contains a moderate amount of green leaf vegetation, small twigs/dried grass and tan to brown friable ingesta. The small intestine contains a small amount of brown mucoid material. The descending colon contains a small amount of formed feces.

There is a small amount of red and frothy fluid within the trachea and mainstem bronchi. The left cranial lung lobe and left caudal lung lobe are mottled pink to red. On cut section, the red discoloration extends into a majority of the right pulmonary parenchyma. There is slight thickening of the mitral valve leaflets as they are slightly opaque. Heart measurements are as follows:

Heart weight: 209.9 g

Left ventricular free wall thickness: 2.0 cm

Interventricular septum thickness: 1.7 cm

Right ventricular free wall thickness: 0.7 cm

The liver has sharp margins. The liver is friable on palpation. The liver weights 392.6 g. The gall bladder contains approximately 5 ml of brown bile.

The spleen is smaller than expected (contracted).

The left and right kidneys are easily removed from the left and right renal capsule, respectively. The urinary bladder is empty.

The endocrine, urinary, hepatobiliary, reproductive, and gastrointestinal systems are examined and no gross abnormalities are observed. The spinal cord is not examined for this case.

MORPHOLOGIC DIAGNOSES:

1. HAIR ED SKIN (PROJECTILE INJURY #1, RIGHT CRANIAL ASPECT OF SHOULDER): GUNSHOT WOUND WITH ASSOCIATED HEMORRHAGE AND TRACT FORMATION (ENTRY, GSW1)
2. HAIR ED SKIN (PROJECTILE INJURY #2, VENTRAL ASPECT OF MANDIBLE): GUNSHOT WOUND WITH ASSOCIATED HEMORRHAGE AND TRACT FORMATION (ENTRY, GSW2)
3. HAIR ED SKIN (PROJECTILE INJURY #3, VENTRAL ASPECT OF NECK): GUNSHOT WOUND (EXIT, GSW3)
4. ORAL CAVITY (PROJECTILE INJURY #4, RIGHT SIDE, OROPHARYNX): GUNSHOT WOUND (ENTRY) WITH ASSOCIATED HEMORRHAGE AND TRACT FORMATION (ENTRY, GSW4)
5. HAIR ED SKIN (#5, DORSUM): GUNSHOT WOUND (ENTRY) WITH ASSOCIATED HEMORRHAGE AND TRACT FORMATION (ENTRY, GSW5)
6. TRACHEA AND ESOPHAGUS: PERITRACHEAL AND PERIESOPHAGEAL HEMORRHAGE AND EMPHYSEMA
7. LUNG (RIGHT LUNG LOBES): PULMONARY CONGESTION AND HEMORRHAGE, MULTIFOCAL, MODERATE
8. MANDIBLE: SYMPHYSIS FRACTURE, COMPLETE WITH ASSOCIATED HEMORRHAGE
9. MANDIBLE (LEFT MANDIBULAR BONE): COMMINUTED FRACTURE WITH ASSOCIATED HEMORRHAGE
10. HUMERUS (LEFT): COMMINUTED FRACTURE, DIAPHYSEAL WITH ASSOCIATED HEMORRHAGE
11. ELBOW REGION (LEFT): PROJECTILE RECOVERY SITE (PROJECTILE #1)
12. ORAL CAVITY (LEFT MANDIBULAR REGION): PROJECTILE RECOVERY SITE (PROJECTILE #2)
13. SKELETAL MUSCLE (NECK, RIGHT SIDE): PROJECTILE RECOVERY SITE (PROJECTILE #3)
14. TEETH (102 AND 103): CROWN FRACTURE, MULTIPLE
15. HEART: MITRAL VALVE THICKENING, MILD (VALVULAR ENDOCARDIOSIS)

COMMENTS:

The cause of death is due to complications of multiple gunshot injuries (hypovolemic shock) as the injuries to the oral cavity would have resulted in severe blood loss.

Based on gross and radiographic examination, 3 projectiles are identified and subsequently recovered. Projectiles are recovered from the left side of the oral cavity (mandible), right side of the neck, and left elbow region. A total of 4 bullet tracts are identified within the body and are as follows:

Tract #1: GSW5 (entry) to medial aspect of left elbow (recovery site of projectile #1). Slight right to left, downward angle

Tract #2: GSW2 (entry) to left side of mandible (recovery site of projectile #2). Back to front, right to left, slight upward

Tract #3: GSW4 (entry) to right side of neck (recovery site of projectile #3). Front to back, slight downward angle

Tract #4: GSW1 (entry) to GSW3 (exit). Back to front, right to left, slight downward angle

Bullet trajectories listed above are all based on the standard anatomic positioning of the dog (standing on all four feet, head forward facing, neck erect) and very likely does not accurately reflect the position the dog was in when shot. Injuries associated with tracts #1, #2, and #3 are due to the projectile recovered at the end of each tract. The projectile that caused the lesions associated with tract #4 is not known. Based on the case findings I have 2 hypotheses as to the cause of tract #4:

1. A fourth projectile could be involved.

Or

2. Upon simple manipulation of the head (flexion) and neck (movement towards the left) a straight line can be made through the following points GSW1 (entry) to GSW3 (exit) to GSW2 (re-entry) to recovery site of projectile #3.

Based on the entry wound characteristics of GSW2, I favor hypothesis #2 as the irregularity of GSW2 is highly suggestive of a re-entry wound.

Range of fire is difficult to determine. The gunshot injuries are not consistent with contact range of fire. No evidence of stippling was observed on the skin of the dog; however, the fur of the dog likely would have prevented burn debris from coming into contact with the skin.

Case summary:

Cause of death: Complications of multiple gunshot injuries

Manner of death: Non-accidental

Formalin fixed tissues have been retained.

Digital images have been taken.

Fresh tissue samples have been saved: lung, liver, kidney, spleen, small intestine, and heart.

Projectiles #1, #2, and #3 have been saved.

No further tests are pending.

Adam W. Stern, DVM, CMI-IV, CFC, Diplomate ACVP
Clinical Assistant Professor

Miscellaneous

Reference Lab #1 - Verified: 12/18/14 11:37 AM by LJ0

Specimen

Whole Body Dead

*Result Comment:

Reason for exam: full body rads

Findings:

Specimen Id

Miley V1437988

1. Images: 12 images of multiple regions of the body.
2. Soft tissue:
 - a. Multiple linear to round gas opacities along the ventral aspect of the mandible
 - b. Gas tracking within the tissue planes of the cranial cervical region near the oropharynx and larynx.
 - c. Numerous irregular round to rectangular metal opacity objects
 - i. Skull: largest measuring 20mm length and 11mm in width lateral to the left canine tooth
 - ii. Cervical region: 2 large 16x23mm metal opacity fragments in the right ventral cervical region near C4 and C5.
 - iii. Left brachial region: multiple large fragments with one that measures 20x22mm in the caudal medial to the humerus.
3. Skull:
 - a. Mandible: multiple fractures:
 - i. Left comminuted oblique fracture at the level between the second and third premolar with a fragment including the first and second premolars displaced laterally and the caudal fragment medially.
 - ii. Right oblique fracture that courses dorsally and caudally distal to the molars.
4. Left humerus:
 - a. Comminuted mid diaphyseal fracture with the distal fragment displaced caudally and moderately overriding.
5. Right antebrachium: normal
6. Thorax:
 - a. Lungs: Moderate increased soft tissue opacity in the left hemothorax.
 - b. Heart/caudal vena cava: small in size and diameter.
7. Abdomen:
 - a. Poor serosal detail
 - b. Stomach is filled with gas and heterogenous ingesta.

Diagnostic interpretation

1. Mandible, left Humerus:
 - a. Gunshot wounds with comminuted fractures, emphysema,
2. Lungs: collapse (alternatively pulmonary hemorrhage/contusions).
3. Abdomen: post mortem changes (alternatively hemorrhage).

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